## NOTES.

The visit of President Loubet to England, as a guest of the British Court, is an event which should not pass unnoticed in the scientific world; he comes as the representative of the French nation. On many occasions President Loubet has shown interest in scientific meetings and congresses held in France, and has extended the warmest hospitality to the foreign members who attended them. His country takes a place in the foremost rank of those which are contributing to the advancement of science, and the names of leading French investigators are familiar words not only in the British Isles, but in all places where scientific knowledge is cultivated. It is a pity that the British associates and correspondants of the Academy of Sciences have not taken the opportunity to welcome President Loubet, as the representatives of the scientific interests of both nations. Such an act of simple courtesy ought not to have been omitted.

Lord Kelvin and Lord Lister have been elected honorary members of the Royal Society of New South Wales.

Lord Lister has been admitted to the honorary freedom of the Merchant Taylors' Company in recognition of his "long and valuable services to the country, and particularly to surgery, by the discovery and application of the antiseptic treatment."

At a meeting held last week in the rooms of the Royal Statistical Society, it was resolved to form a society for the promotion of scientific and philosophical studies in sociology. A committee was appointed to consider the question of the scope and aims of the society, and to draft a constitution to be submitted to a meeting in the autumn.

A Paris correspondent writes:—On July 3 the *Temps* resolved to send a message round the world by telegraphy, using the Anglo-French system of transoceanic cables. The message was sent from Paris at 11 a.m., and consisted of the two words *Temps,* Paris, with the indication of the route, *viâ* Malta, Aden, Singapore, Brisbane, Vancouver, and French Atlantic Cable. As the indication of the route is not paid for, the cost of the experiment was only 13*s.* 1½*d.* No previous explanation or preliminary notice had been served to the several companies, but the organisation of the Anglo-French system is so perfect that the message arrived at the *Temps* office at 5.30 p.m. The time spent had been six hours for travelling about 40,000 miles, a measure of the commercial speed of electricity on the occasion of the inauguration of the American, Sandwich, Philippine, and Hong Kong system.

The automobile races in Ireland last week give remarkable evidence of the power and perfection of modern motors. The race for the Gordon Bennett Cup, over a course of 370¾ miles, was won by a German car, driven by a Belgian, M. Jenatzy. The net time spent in covering this distance was 6h. 39m., which gives an average of nearly 56 miles per hour on ordinary roads. The second place was taken by a French car, the time being 6h. 50m. 40s. Three other competitors finished the race, two of them driving French cars, while the fifth place was taken by an English car. Some extraordinary speeds were attained by automobiles over a course in Phœnix Park, Dublin, on Saturday. For racing purposes the programme was divided into three sections, one for motor cycles, one for touring cars, and one for racing cars. The fastest motor cycle travelled at the rate of 48·2 miles an hour, and the fastest touring car at 46·5 miles an hour. In the racing section a Décauville light racer covered the course in 1m. 53 1-5s., at the rate of 62½ miles an hour; a 60-h.p. Mercédès at the rate of 78 miles an hour; a 70-h.p. Mors at the rate of 83 miles an hour, and also at 85·9 miles an hour.

Reuter's Agency is informed that Commander Irizar, the Argentine naval officer who will command the relief expedition which is being sent out by the Argentine Government in search of Dr. Otto Nordenskjöld's South Polar Expedition, will leave for Buenos Ayres in a few weeks. The ship—the *Uruguay*—will be in charge of Argentine officers and crew, and will be provisioned for two years. It is not, however, probable that she will winter in the Antarctic.

The eighty-sixth annual meeting of the Société helvétique des Sciences naturelles will be held at Locarno on September 2–5. At the same time and place the annual meetings will be held of the Swiss societies of geology, botany, zoology, and chemistry, and the Zurich Physical Society. In addition to the general and special meetings, there will be several receptions, banquets, and excursions to places of interest. The officers of the annual committee are M. A. Pioda, president, Prof. G. Mariani, vice-president, Dr. R. Natoli and M. C. Orelli, secretaries.

An expedition recently left Baltimore for the purpose of making an exhaustive study of the Bahama Islands, and presenting reports upon them to the United States Government. We learn from the *Scientific American* that the expedition originated with Prof. George B. Shattuck, of the Johns Hopkins University, and is under the auspices of the Geographical Society of Baltimore, which defrays a portion of its expenses. Some of the principal lines of investigation will be concerned with the animal and plant life of the islands. The geology of the group will also be examined, and a bench mark will be left with the view of ascertaining to what extent, if any, the Bahamas are sinking or rising above sea level. The industries will be made the subject of a special chapter of the reports, as well as the physical condition of the inhabitants, the extent of the commerce of the principal towns, and any other economic features which may suggest themselves. An elaborate outfit of scientific apparatus for studying the meteorology and climatic conditions, for microscopic examination, and for photographic work has been provided. The diseases which may be prevalent and general sanitary conditions will be included in the investigation. This portion of the work will be in charge of Dr. Clement A. Penrose, of Baltimore, assistant director of the expedition.

In Nature of April 30 (vol. lxvii. p. 601) Prof. J. J. Thomson put forward the view that the energy of the Becquerel radiation given out by radio-active substances is produced by a change in the configuration of the atom. Dr. J. Stark writes from Göttingen to state that this view was suggested by him in his book "Die Elektrizität in Gasen" (Leipzig, 1902, p. 34), and later in the *Naturwissenschaftliche Rundschau* (January, 1903). Dr. Stark adds:—"As the transformation of atoms in some elements is still going on, it may be supposed that there was a time when our chemical atoms did not exist in the present amount, while other types of matter were more common. In the later change of the arrangement of the positive and negative electrons, or in the genesis of the present chemical atoms, a very large amount of the potential energy of their electrons was transformed to kinetic energy. The energy liberated in the change of chemical atoms is of a higher order of magnitude than that produced in known chemical reactions. Therefore it is reasonable to suppose that the temperature of the sun and stars is partly due to the genesis of chemical atoms."

THE prospect of active work in connection with the ship canal across the Isthmus of Panama has directed attention to the climate of the district, in which engineering work of exceptional difficulty will have to be undertaken. The results are generally reassuring, and with ordinary care a repetition of the horrors that accompanied the construction of the Panama railway need not be feared. The most noticeable feature in the temperature factor is its constancy throughout the year, the monthly range, in the mean, being confined between 78°.4 and 80°.1. The daily range on the coast is from 68° to 87°, and in the interior from 64° to 94°. It is easy to see the effect of the oceans in thus limiting the range of temperature, but necessarily there is an increase in the humidity, which is always high, throughout the year. There is a great difference in the rainfall on the Pacific and on the Atlantic coasts; about 140 inches may be anticipated on the former, while only half that amount will fall on the Atlantic side. From January to April the fall is very slight throughout the Isthmus, and therefore several successive months of dry weather can be counted upon, which cannot but be of great advantage in the engineering operations. Winds are always light, and give no trouble. Greater velocities than twenty miles an hour are rarely met with. The general health statistics are not unfavourable. Recent inquiries show that the mortality due to diseases of the climate has steadily diminished since 1881, while the percentage of deaths arising from European diseases has not increased. Of the total death rate, 91 per cent. is due to chronic organic diseases common to all countries, and only 9 per cent. is chargeable to local effects. This material improvement is due, in some measure, to the fact that the excavations have reached a level below the poisonous emanations of decaying organic matter, while, on the other hand, greater sanitary precautions have reduced the effects of the most deadly of the infectious diseases, yellow fever. Colon has been practically free from this scourge for some time, but improvements in Panama are loudly demanded.

IN the *Rendiconto* of the Naples Academy for April, Prof. Ernesto Pascal gives the integration of a differential equation of Riccati's form, but of a more general character than those previously considered. The right-hand side of Prof. Pascal's equation contains three constant coefficients, and the equations integrated by Malmstén, Brioschi, and Siacci are the particular cases deduced by putting one or other of these coefficients equal to zero.

VOL. v., No. 1, of the series of monograph supplements of the *Psychological Review* is a thesis by Dr. Joseph W. L. Jones on "Sociality and Sympathy." The author traces the development of consciousness to the point at which "consciousness of kind" emerges, and discusses the gradual evolution of social relationships and the rise of sympathy in any given race.

DR. COSTANTINO GORINI discusses in the Lombardy *Rendiconti* the remarkable power exhibited by the typhus bacillus of spreading along the surfaces of solids in contact with the nutrient liquid. This effect the author considers is due to the formation of filaments rather than to the mobility of the bacteria themselves, but it suggests the danger which may arise from watering food-plants with water containing the bacteria.

A REPORT on the dilatation of steel at high temperatures is given by MM. G. Charpy and L. Grenet in the *Bulletin de la Société d'Encouragement* for May. The most noticeable features brought out in the experiments were the sudden contraction at a temperature of about 700° common to carbon steels, the existence of a second point of contraction at about 300° in tempered steel containing 0.65 to 1 per cent. of carbon, and of a further point of contraction near 150° for tempered steels with more than 1 per cent. of carbon, and the absence of any observed relation between the dilatation-curves of nickel steel and their magnetic properties.

THE eleventh volume of the *Atti* of the Naples Academy of Physical and Mathematical Sciences contains a monograph by G. de Lorenzo and Carlo Riva on the crater of the Astroni, one of the most remarkable craters in the Phlegrean fields. It derives a melancholy interest from the fact that, before its completion, Signor Riva met with his death in the prime of life while ascending Monte Grigna from the Lake of Como. Another noteworthy feature is the monograph of 220 pages on the totality of prime numbers up to a given limit, by G. Torelli.

UNDER the title of "Bathymeter," Mr. Leonard Murphy describes in the *Economic Proceedings* of the Royal Dublin Society a simple apparatus for gauging the depth of liquids in wells and tanks. An air tube dips into the liquid to be measured, and an air compressor is connected both with this tube and with a reservoir of liquid into which there dips a gauge glass. On working the compressor the liquid in the gauge glass rises until the pressure is sufficient to force the air out at the bottom of the air tube, and the height of liquid in the gauge glass then indicates the height of liquid in the well above the end of the tube.

IN the *Annali di matematica pura ed applicata*, Signor T. Levi-Civita deals with singular solutions in the problem of three bodies or particles which attract each other according to the Newtonian law. The only case in which singular solutions occur is when, at some instant of the motion, two of the particles coincide; this involves an impact between the particles. The motion in which the particles are approaching impact is called by the author a trajectory of collision, the reversed motion being a trajectory of ejection. The case discussed is that in which the bodies are moving in one plane, and the mass of one is negligible compared with those of the other two.

FROM the *Economic Journal* we take the following table of the ages of German university professors in the year 1901, quoted from an article by Dr. F. Eulenburg in the *Jahrbücher für Nationaloekonomie* :—

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age ... ... | | 30 | | 35 | | 40 | | 45 | | 50 | | 55 |
| Number ... | 2 | | 23 | | 124 | | 206 | | 256 | | 262 | |
| Age ... ... | | 60 | | 65 | | 70 | | 75 | | 80 | | 85 |
| Number ... | 197 | | 194 | | 108 | | 36 | | 18 | | 3 | |

where the upper figures represent ages, and the lower figures represent numbers of German professors in 1901 in the intervals between those ages. In 1890 the maximum number was between the ages of forty-six and fifty.

IN *Cosmos*, M. Lucien Fournier discusses the phenomenon recently described as the "flow of marble," which results in a gradual bending or deformation of marble blocks, as was described by Dr. T. J. J. See in a letter to NATURE of November 20, 1902 (vol. lxvii. p. 56). Among the theories proposed to account for the effect, the actions of sunshine and moisture have hitherto received support. M. Fournier now suggests another possible cause—elasticity. It is observed that blocks of granite frequently expand when they have been relieved from the pressure of the surrounding rocks in the process of quarrying. It is now suggested that a similar cause may account for the bending of the blocks of marble, and this explanation would account for deflections which assume a different direction from that which would be expected if heat and damp were the causes.

THE *Journal de Physique* contains two short papers by M. R. Blondlot on a new kind of light obtained originally after filtering the rays from a focus tube through aluminium or black paper. In studying the action of the radiations on an electric spark, they were shown to present the phenomena of rectilinear polarisation, and it was further found that both quartz and sugar produced rotatory effects. On passing the rays through a plate of mica, double refraction took place; finally, the existence of refraction was proved by concentrating the rays with a lens, and reflection was also observed. It followed that the radiations were entirely different from Röntgen rays, and must be attributable to a new kind of light. In the second paper in the July number, M. Blondlot finds that radiations possessing identical properties are obtained from an Auer lamp, and that the new rays will pass through certain metals and substances which are opaque to the radiations discovered by Prof. Rubens.

IN the *Proceedings* of the Royal Society for March, Mr. H. M. Macdonald, F.R.S., gave an investigation of the bending of electric waves round a spherical obstacle, which was suitable to explain Mr. Marconi's successes in employing wireless telegraphy over distances representing considerable arcs of the earth's circumference. Mr. Macdonald's solution has been called in question in papers communicated to the Royal Society by Lord Rayleigh and M. Poincaré. It is pointed out that Mr. Macdonald's conclusion as to the diffraction taking place without the production of any sensible shadow does not agree with the results known in the case of light; indeed, if the conclusion were accepted without any limitations, there would necessarily be daylight all night. From a mathematical point of view the results depend on the assumption that the spherical functions entering into the expression for the potential satisfy a condition of the form $dW/dr = ikW$; this is true in the case of spherical functions of low order, but unless the series for the potential is uniformly convergent, the solution may involve spherical functions of high order, for which the condition in question does not hold good.

WE have received from Prof. B. Sresnevsky a pamphlet containing synoptic tables of the daily rainfall values at all the meteorological stations of the Russian Baltic provinces for the year 1900.

THE *Transactions* of the South African Philosophical Society for April last contains a lengthy contribution by Mr. J. R. Sutton, superintendent of the De Beers meteorological station at Kenilworth, Kimberley, on the results of some experiments upon the rate of evaporation. For, as the author points out, of the dozens of patterns of evaporators, not one has hitherto been unreservedly accepted as a standard, and the results obtained from some of them show a rate of evaporation fully twice as great as others. The greatest mean annual result of seven years' observations by the author gives an evaporation of 90·11 inches, and was obtained from a copper pan about 5 inches deep and 8 inches in diameter, kept nearly full of water, and protected from the sun's rays. The monthly means varied from about 3 inches in June to nearly 12 inches in each of the months November and December. For the year 1900, the comparative annual values given by four evaporators are:—8-inch copper pan, 90·82 inches; a screened iron tub, enamelled white inside and out, 14 inches in diameter and 20 inches high, 61·98 inches; circular steel tank, nearly 4 feet in diameter and 30 inches deep, 55·21 inches; a Piche evaporating tube of the usual pattern, 82·83 inches. The author finds (1) that the most potent agency regulating the rate of evaporation was the humidity of the air; (2) that a wind factor is suggested; and (3) that the great perturbing influence attributed to the temperature of the water has not been exactly confirmed. The paper will well repay a careful study.

EVIDENCE of a connection between the occurrence of thunderstorms and the moon's age has been referred to in NATURE on several occasions. Prof. W. H. Pickering gives a table in *Popular Astronomy* to show the results of investigations of this relationship by various observers. From this table, which is abridged below, it will be seen that, with one exception, the number of thunderstorms occurring near the first two phases of the moon is greater than the number occurring near the last two.

*The Moon's Phases and Thunderstorms.*

| Station. | Authority. | Years. | New and First Quarter. | Full and Last Quarter. |
|---|---|---|---|---|
| Kremsmünster ... | Wagner ... ... | 86 | 54 | 46 |
| Aix la Chapelle ... | Polis ... ... | 60 | 54 | 46 |
| Batavia, Java ... | Van d. Stok ... | 9 | 52 | 48 |
| Gotha ... ... ... | Lendicke ... | 9 | 73 | 27 |
| Germany ... ... | Köppen ... ... | 5 | 56 | 44 |
| Glatz County ... | Richter ... .. | 8 | 62 | 38 |
| N. America ... | Hazen ... ... | 1 | 57 | 43 |
| Prague ... ... | Gruss ... ... | 20 | 51 | 49 |
| ,, ... ... | ,, ... ... | 20 | 53 | 47 |
| Göttingen ... ... | Meyer ... ... | 24 | 54 | 46 |
| Greenwich ... ... | MacDowall ... | 13 | 54 | 46 |
| Madrid ... .. | Ventatasta ... | 20 | 52 | 48 |
| Providence, R.I. | Seagrave ... ... | 6 | 49 | 51 |

Prof. Pickering adds:—"The number of observations here collected seems to be large enough to enable us to draw definite conclusions, without fear that further records will revise or neutralise them. From these observations we conclude that there really is a greater number of thunderstorms during the first half of the lunar month than during the last half, also that the liability to storms is greatest between new moon and the first quarter, and least between full moon and last quarter. Also we may add that while theoretically very interesting, the difference is not large enough to be of any practical consequence. Thus it would seem that, besides the tides and certain magnetic disturbances, there is a third influence that we must in future attribute to the moon."

FRESH evidence is continually coming to light to prove the artistic skill of the cave men of late Palæolithic times. M. E. Cartailhac has begun a memoir in *l'Anthropologie* (tome xiv. No. 2) on the stations at Bruniquel, on the banks of the Aveyron, which will add materially to our knowledge of these interesting people. Especially remarkable is an engraving, published by the same author (p. 179), of two bands of horses in alignment on a slab of stone from the main cave at Chaffaud, Vienne. This is the first example of regular grouping, and an indication of perspective in Palæolithic pictorial art.

THE shell-heaps of the Lower Fraser River, British Columbia, have been carefully investigated by Mr. Harlan I. Smith in connection with the Jesup North Pacific Expedition, and his results are now published, with numerous illustrations, in the *Memoirs* of the American Museum of Natural History, vol. iv. These shell-heaps seem to have certain peculiarities of their own; the objects found in them are more numerous and of higher artistic value than those found in the coast shell-heaps, and skeletons are frequently found in the former and but rarely in the latter. It is probable that at an early time a migration took place from the interior to the coast and Vancouver Island. This migration carried the art of stone-chipping, pipes and decorative art to the coast. The culture of the ancient people who discarded the shells forming these heaps was in all essential particulars similar to that of the tribes at present inhabiting the same area, but it was under a much stronger influence from the interior than is found at the present time.

Archæological excavations have been made by Lieut. L. Desplagnes in the tumuli of Killi, in the region of Goundam, in the neighbourhood of Timbuktu (*cf.* *l'Anthropologie*, tome xiv. p. 151). The mounds appear to have been the tombs of chiefs, along with whom were buried women and captives, and large quantities of offerings of various kinds. The originators of these funeral monuments surpassed the existing people of the district in the art of making varnished pottery and in the fabrication of bronze. The presence of marine shells shows that they had relation with maritime peoples, and other objects prove an extensive commerce. There appears to be some evidence that these unknown people were partly related to the Berbers, and that they were overwhelmed by the spread of Islamism in the eleventh century. The author thinks that perhaps certain isolated peoples whom he mentions may be the fugitive remnants of this formerly relatively advanced nation.

A memoir on the geology of North Arran, South Bute, and the Cumbraes, with parts of Ayrshire and Kintyre, has just been issued by the Geological Survey. It is the work mainly of the late William Gunn, with contributions by Sir A. Geikie, Dr. Peach, and Mr. A. Harker, and is an explanation of Sheet 21 of the one-inch map of Scotland. A great variety of subjects is dealt with, as may be gathered from the lengthy table of formations represented, and there is much to justify the statement referred to by the authors, that the geology of Arran is an epitome of that of Scotland. The central granite mass forms the dominant feature, rising to 2866 feet at Goatfell, and it is bordered by the older metamorphic rocks, schists into which, as observed by Hutton more than a century ago, the granite has been intruded. Rocks probably of Arenig age, black schists, cherts and grits, similar to those of Ballantrae, and associated with old lavas and tuffs, have been discovered in the course of the survey. Notable additions have also been made to our knowledge of the volcanic rocks, and especially with respect to a huge volcanic vent, probably of Tertiary age, in which are preserved remnants of Rhætic, Liassic and Cretaceous formations, hitherto unrecognised in the region. Full particulars are given of the granite, and of the dykes and sills of felsite and quartz porphyry, pitchstone, and other rocks. The Old Red Sandstone and the Carboniferous rocks, the determination of the Triassic age of the newer red sandstones, conglomerates and marls, and the accounts of the Glacial phenomena and economic geology, furnish many topics of great interest. The memoir contains ten photographic plates, and is issued at the price of 4s.

The additions to the Zoological Society's Gardens during the past week include a Pinche Monkey (*Midas oedipus*) from Colombia, presented by Mr. E. G. Percy; two Grey-headed Love-birds (*Agapornis cana*) from Madagascar, presented by Miss Luff; a Whistling Swan (*Cygnus columbianus*) from North America, presented by Dr. Cecil French; a Mexican Snake (*Coluber melanoleucus*) from Mexico, presented by Mr. W. G. Kershaw; two Whistling Swans (*Cygnus columbianus*), a Mocassin Snake (*Tropidonotus fasciatus*), a King Snake (*Coronella getula*), two Mexican Snakes (*Coluber melanoleucus*), a Seven-banded Snake (*Tropidonotus septemvittatus*), two Testaceous Snakes (*Zamenis flagelliformis*), a Striped Snake (*Tropidonotus ordinatus sirtalis*), a Long-nosed Snake (*Heterodon nasicus*) from North America, a Chained Snake (*Coluber catenifer*), a Couch's Snake (*Tropidonotus ordinatus couchi*) from California, a Horned Lizard (*Phrynosoma cornutum*) from Mexico, two Smooth Snakes (*Coronella austriaca*), an Ocellated Sand Skink (*Chalcides ocellatus*), European; a Black-faced Spider Monkey (*Ateles ater*) from Eastern Peru, a Common Rat Kangaroo (*Potorous tridactylus*), two Brush Bronze-winged Pigeons (*Phaps elegans*) from Australia, a Banded Aracari (*Pteroglossus torquatus*) from Central America, a Rat-tailed Opossum (*Didelphys nudicaudata*), a Salvin's Amazon (*Chrysotis salvini*) from South America, two Cutthroat Finches (*Amadina fasciata*) from West Africa, deposited; a Yak (*Poephagus grunniens*), born in the Gardens.

## OUR ASTRONOMICAL COLUMN.

Comet 1903 *c*.—The following elements and ephemeris have been computed by M. G. Fayet, Paris, from observations made on June 22, 24, and 27, and published in *Circular* No. 60 of the Kiel Centralstelle :—

*Elements.*

$$T = 1903\ \textit{Aug.}\ 28{\cdot}4715\ (\textit{M.T. Paris}).$$

$$\left.\begin{array}{l} \omega = 125^\circ\ 56'\ 53'' \\ \Omega = 293\ \ 38\ \ 40 \\ i = \ \ 84\ \ \ 6\ \ 48 \end{array}\right\} 1903{\cdot}0.$$

$$\log q = 9{\cdot}539534$$

*Ephemeris* 12*h*. (*M.T. Paris*).

| 1903 | α | δ | log Δ | Brightness |
|---|---|---|---|---|
| | h. m. s. | ° ′ | | |
| July 5 | 21 27 33 | +12 10·9 | 9·6105 | 4·5 |
| ,, 9 | 21 6 46 | +24 44·8 | 9·5213 | 7·6 |
| ,, 13 | 20 26 15 | +38 57·9 | 9·4322 | 12·9 |
| ,, 17 | 18 53 22 | +60 43·0 | 9·4424 | 14·1 |
| ,, 21 | 15 46 14 | +68 40·8 | 9·4948 | 12·9 |

On July 13 the comet will, according to the above ephemeris, be about 7m. 20s. following, and 58′·9 south of γ Cygni, whilst on July 21 it will be seen in the constellation Draco a little more than one-third the distance from γ Ursæ Minoris to η Draconis on a straight line joining these two stars.

The above scale of brightness takes for its unit value the brightness at the time of discovery, and on June 25, when the value on this scale was about 1·4, M. Pidoux recorded that the comet was equal in brightness to an eighth magnitude star.

Penetrative Solar Radiations.—In a paper communicated to No. 24 of the *Comptes rendus*, M. R. Blondlot describes some simple experiments he has performed which appear to show that certain rays (which he calls "the *n* rays") emitted by the sun are capable of passing through various kinds of wood, metals, &c. He placed a fine glass tube containing a phosphorescent material, *e.g.* sulphide of calcium, in a darkened room in which there was a window exposed to the sun, but closed by means of an oaken shutter 15mm. thick, and then found that the phosphorescent material, which he had previously exposed for a very short time to feeble sunlight, continued to glow, but if a plate of lead were interposed between the shutter and the tube the phosphorescence became feebler, whilst it again increased when the lead was removed. Then an oaken joist 3cm. thick, a piece of cardboard, and several plates of aluminium were successively interposed, and the